Jivanjot S. Brar Shan Bains

A00774427 A00737179

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TEST CASES

Rule #	Test Description	Tool Used		Expected Result	Pass/Fail
1)	Allow Inbound / Outbound TCP packets on allowed ports i.e. port 22, 80 and 443	Hping3	•	The firewall should allow TCP packets on allowed ports	Pass. Detailed results are attached below.
2)	Drop TCP packets to not Allowed ports i.e port 111	Hping3	•	The firewall should not allow any packets	Pass. Detailed results are attached below.
3)	Allow Inbound / Outbound UDP packets on allowed ports i.e. port 53	Hping3	•	The firewall should allow UDP packets on allowed ports	Pass. Detailed results are attached below.
4)	Drop UDP packet to not allowed ports i.e port 137	Hping3	•	The firewall should not allow any packets	Pass. Detailed results are attached below.
5)	Allow Inbound / Outbound ICMP packets based on type numbers (testing type o and 8)	Ping	•	The firewall should allow ICMP packets based on type numbers	Pass. Detailed results are attached below.
6)	Drop any packets that fall through the default rules or are intended for the firewall machine	Hping3	•	The firewall should drop all packets that fall through the default rule or are intended for the firewall machine	Pass. Detailed results are attached below
7)	Drop all packets with a source address from the outside matching your internal network	Hping3	•	The firewall should drop all the packets that hit the public network card but pretends to be the internal machine	Pass. Detailed results are attached below
8)	Drop all packets that are coming the "wrong" way (i.e.	Hping3	•	The firewall should drop all packets that are	Pass. Detailed Results are

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	Inbound SYN packets on high port such as 2048)			coming the "Wrong" way such as an inbound SYN packet on a high port.	attached below		
9)	Allow fragmented packets	Hping3	•	The firewall should allow the fragmented packets	Pass. Detailed Results are attached below.		
10)	Accept TCP connections that belong to an existing connection.	Hping3	•	The firewall should accept TCP connections that belong to an existing connection.	Pass. Detailed results are attached below		
11)	Drop all packets with the SYN and FIN bit set	Hping3	•	The firewall should drop all packets with the SYN and FIN bit set.	Pass. Detailed results are attached below		
12)	Drop all Telnet packets	Hping3	•	The firewall should drop all Telnet packets.	Pass. Detailed results are attached below		
13)	Drop all external TCP or UDP traffic directed to ports 32768 – 32775, 137 – 139.	Hping3	•	The firewall should drop all TCP and UDP packets directed to ports 32768 – 32775 and 137 -139.	Pass. Detailed results are attached below		
14)	Drop all external TCP traffic directed to TCP ports 111 and 515	Hping3	•	The firewall should drop all external traffic directed towards TCP ports 111 and 515.	Pass. Detailed results are attached below		

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Detailed Results

Rule # Results HPING₃ 11 **Before Rule** [root@DataComm ~]# hping3 192.168.0.17 -p 80 -S -c 5 HPING 192.168.0.17 (em1 192.168.0.17): S set, 40 headers + 0 data bytes --- 192.168.0.17 hping statistic ---5 packets tramitted, o packets received, 100% packet loss round-trip min/avg/max = 0.0/0.0/0.0 ms [root@DataComm ~]# hping3 192.168.0.17 -p 443 -S -c 5 HPING 192.168.0.17 (em1 192.168.0.17): S set, 40 headers + o data bytes --- 192.168.0.17 hping statistic ---5 packets tramitted, o packets received, 100% packet loss round-trip min/avg/max = 0.0/0.0/0.0 ms **INBOUND** [root@DataComm ~]# hping3 192.168.0.17 -c 5 -S -p 80 HPING 192.168.0.17 (em1 192.168.0.17): S set, 40 headers + 0 data bytes len=46 ip=192.168.0.17 ttl=63 DF id=0 sport=80 flags=SA seq=0 win=29200 rtt=2.0 ms len=46 ip=192.168.0.17 ttl=63 DF id=0 sport=80 flags=SA seq=1 win=29200 rtt=1.0 ms len=46 ip=192.168.0.17 ttl=63 DF id=0 sport=80 flags=SA seq=2 win=29200 rtt=1.9 ms len=46 ip=192.168.0.17 ttl=63 DF id=0 sport=80 flags=SA seq=3 win=29200 rtt=0.9 ms len=46 ip=192.168.0.17 ttl=63 DF id=0 sport=80 flags=SA seq=4 win=29200 rtt=2.1 ms --- 192.168.0.17 hping statistic ---5 packets tramitted, 5 packets received, 0% packet loss round-trip min/avg/max = 0.9/1.6/2.1 ms [root@DataComm ~]# hping3 192.168.0.17 -c 5 -S -p 443 HPING 192.168.0.17 (em1 192.168.0.17): S set, 40 headers + o data bytes len=46 ip=192.168.0.17 ttl=63 DF id=25027 sport=443 flags=RA seq=0 win=0 rtt=2.2 ms len=46 ip=192.168.0.17 ttl=63 DF id=25028 sport=443 flags=RA seq=1 win=0 rtt=0.9 ms len=46 ip=192.168.0.17 ttl=63 DF id=25029 sport=443 flags=RA seq=2 win=0 rtt=2.2 ms len=46 ip=192.168.0.17 ttl=63 DF id=25030 sport=443 flags=RA seq=3 win=0 rtt=0.9 ms len=46 ip=192.168.0.17 ttl=63 DF id=25031 sport=443 flags=RA seq=4 win=0 rtt=2.1 ms --- 192.168.0.17 hping statistic ---5 packets tramitted, 5 packets received, 0% packet loss round-trip min/avg/max = 0.9/1.7/2.2 ms **OUTBOUND** [root@DataComm ~]# hping3 192.168.0.22 -S -p 80 -c 5 HPING 192.168.0.22 (p3p1 192.168.0.22): S set, 40 headers + 0 data bytes

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len=46 ip=192.168.0.22 ttl=63 DF id=0 sport=80 flags=SA seq=0 win=29200 rtt=1.9 ms len=46 ip=192.168.0.22 ttl=63 DF id=0 sport=80 flags=SA seq=1 win=29200 rtt=2.0 ms len=46 ip=192.168.0.22 ttl=63 DF id=0 sport=80 flags=SA seq=2 win=29200 rtt=2.1 ms len=46 ip=192.168.0.22 ttl=63 DF id=0 sport=80 flags=SA seq=3 win=29200 rtt=2.0 ms len=46 ip=192.168.0.22 ttl=63 DF id=0 sport=80 flags=SA seq=4 win=29200 rtt=1.0 ms --- 192.168.0.22 hping statistic --- 5 packets transmitted, 5 packets received, 0% packet loss

5 packets transmitted, 5 packets received, 0% packet loss round-trip min/avg/max = 1.0/1.8/2.1 ms

[root@DataComm ~]# hping3 192.168.0.22 -S -p 443 -c 5 HPING 192.168.0.22 (p3p1 192.168.0.22): S set, 40 headers + 0 data bytes len=46 ip=192.168.0.22 ttl=63 DF id=21213 sport=443 flags=RA seq=0 win=0 rtt=1.8 ms len=46 ip=192.168.0.22 ttl=63 DF id=21214 sport=443 flags=RA seq=1 win=0 rtt=0.9 ms len=46 ip=192.168.0.22 ttl=63 DF id=21215 sport=443 flags=RA seq=2 win=0 rtt=2.0 ms len=46 ip=192.168.0.22 ttl=63 DF id=21216 sport=443 flags=RA seq=3 win=0 rtt=0.8 ms len=46 ip=192.168.0.22 ttl=63 DF id=21217 sport=443 flags=RA seq=4 win=0 rtt=1.9 ms --- 192.168.0.22 hping statistic ---

5 packets transmitted, 5 packets received, 0% packet loss round-trip min/avg/max = 0.8/1.5/2.0 ms

2]

[root@DataComm ~]# hping3 192.168.0.17 -p 111 -S -c 5 HPING 192.168.0.17 (em1 192.168.0.17): S set, 40 headers + 0 data bytes

--- 192.168.0.17 hping statistic --5 packets tramitted, o packets received, 100% packet loss
round-trip min/avg/max = 0.0/0.0/0.0 ms

3]

HPING3 MESSAGE

[root@DataComm ~]# hping3 192.168.0.23 --udp -p 137 -s 0 -c 3

4)

HPING3 MESSAGE

[root@DataComm ~]# hping3 -S 192.168.0.22 --udp -p 137 -s 0 -c 3 HPING 192.168.0.22 (em1 192.168.0.22): S set, 40 headers + 0 data bytes --- 192.168.0.22 hping statistic ---3 packets transmitted, 0 packets received, 100% packet loss round-trip min/avg/max = 0.0/0.0/0.0 ms

5)

PING MESSAGE

PING 192.168.0.22 (192.168.0.22) 56(84) bytes of data. 64 bytes from 192.168.0.22: icmp_seq=1 ttl=63 time=0.690 ms 64 bytes from 192.168.0.22: icmp_seq=2 ttl=63 time=1.90 ms 64 bytes from 192.168.0.22: icmp_seq=3 ttl=63 time=0.590 ms

--- 192.168.0.22 ping statistics ---

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3 packets transmitted, 3 received, 0% packet loss, time 2002ms rtt min/avg/max/mdev = 0.590/1.061/1.903/0.596 ms

FILTER TABLE

Chain INPUT (policy DROP 7 packets, 280 bytes)
Chain OUTPUT (policy DROP 7 packets, 280 bytes)

HPING3 MESSAGES

[root@DataComm ~]# hping3 -S 192.168.0.22 -p 80 -a 192.168.1.22 -c 3 HPING 192.168.0.22 (em1 192.168.0.22): NO FLAGS are set, 40 headers + 0 data bytes 3 packets transmitted, 0 packets received, 100% packet loss round-trip min/avg/max = 0.0/0.0/0.0 ms

HPING3 MESSAGES

[root@DataComm ~]# hping3 -S 192.168.0.22 -p 2048 -c 3
HPING 192.168.0.22 (em1 192.168.0.22): S set, 40 headers + 0 data bytes
3 packets transmitted, 0 packets received, 100% packet loss
round-trip min/avg/max = 0.0/0.0/0.0 ms

HPING MESSAGES
[root@DataComm ~]# hping3 \$EXT IP -c 3 -f -p 443 -d 200 -S

HPING 192.168.0.22 (em1 192.168.0.22): S set, 40 headers + 200 data bytes len=46 ip=192.168.0.22 ttl=63 DF id=49301 sport=443 flags=RA seq=0 win=0 rtt=0.8 ms len=46 ip=192.168.0.22 ttl=63 DF id=49302 sport=443 flags=RA seq=1 win=0 rtt=1.7 ms len=46 ip=192.168.0.22 ttl=63 DF id=49303 sport=443 flags=RA seq=2 win=0 rtt=0.7 ms

111 HPING MESSAGE

HPING 192.168.0.23 (em1 192.168.0.23): A set, 40 headers + 0 data bytes len=46 ip=192.168.0.23 ttl=63 DF id=37152 sport=80 flags=R seq=0 win=0 rtt=1.9 ms len=46 ip=192.168.0.23 ttl=63 DF id=37153 sport=80 flags=R seq=1 win=0 rtt=1.8 ms len=46 ip=192.168.0.23 ttl=63 DF id=37154 sport=80 flags=R seq=2 win=0 rtt=0.6 ms

HPING MESSSAGE

HPING 192.168.0.23 (em1 192.168.0.23): SF set, 40 headers + 0 data bytes 3 packets transmitted, 0 packets received, 100% packet loss

round-trip min/avg/max = 0.0/0.0/0.0 ms

12] HPING MESSAGE

HPING 192.168.0.23 (em1 192.168.0.23): S set, 40 headers + 0 data bytes

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3 packets transmitted, o packets received, 100% packet loss round-trip min/avg/max = 0.0/0.0/0.0 ms



HPING MESSAGE

UDP

PACKETS BETWEEN 32768-32775

HPING 192.168.0.23 (em1 192.168.0.23): udp mode set, 28 headers + o data bytes 3 packets transmitted, o packets received, 100% packet loss round-trip min/avg/max = 0.0/0.0/0.0 ms

PACKETS BETWEEN 137-139

HPING 192.168.0.23 (em1 192.168.0.23): udp mode set, 28 headers + 0 data bytes 3 packets transmitted, 0 packets received, 100% packet loss round-trip min/avg/max = 0.0/0.0/0.0 ms

TCP

PACKETS BETWEEN 32768-32775

HPING 192.168.0.23 (em1 192.168.0.23): S set, 40 headers + 0 data bytes 3 packets transmitted, 0 packets received, 100% packet loss round-trip min/avg/max = 0.0/0.0/0.0 ms

PACKETS BETWEEN 137-139

HPING 192.168.0.23 (em1 192.168.0.23): S set, 40 headers + 0 data bytes 3 packets transmitted, 0 packets received, 100% packet loss round-trip min/avg/max = 0.0/0.0/0.0 ms

14)

HPING MESSAGE

TCP

PACKECTS TO PORT 111

HPING 192.168.0.23 (em1 192.168.0.23): S set, 40 headers + 0 data bytes 3 packets transmitted, 0 packets received, 100% packet loss round-trip min/avg/max = 0.0/0.0/0.0 ms

PACKECTS TO PORT 515

HPING 192.168.0.23 (em1 192.168.0.23): S set, 40 headers + 0 data bytes 3 packets transmitted, 0 packets received, 100% packet loss round-trip min/avg/max = 0.0/0.0/0.0 ms

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Test Script Results

[1) TESTING NMAP SCAN OF THE FIREWALL: SHOULD SHOW PORT 22, 80, 443 AND 11 OPEN AT LEAST

Starting Nmap 6.40 (http://nmap.org) at 2014-02-13 18:07 PST

NSE: Loaded 110 scripts for scanning.

NSE: Script Pre-scanning.

Initiating ARP Ping Scan at 18:07

Scanning 192.168.0.23 [1 port]

Completed ARP Ping Scan at 18:07, 0.01s elapsed (1 total hosts)

Initiating Parallel DNS resolution of 1 host. at 18:07

Completed Parallel DNS resolution of 1 host. at 18:07, 0.00s elapsed

Initiating SYN Stealth Scan at 18:07

Scanning 192.168.0.23 [1000 ports]

Discovered open port 80/tcp on 192.168.0.23

Discovered open port 22/tcp on 192.168.0.23

Completed SYN Stealth Scan at 18:07, 4.23s elapsed (1000 total ports)

Initiating Service scan at 18:07

Scanning 2 services on 192.168.0.23

Completed Service scan at 18:07, 6.01s elapsed (2 services on 1 host)

Initiating OS detection (try #1) against 192.168.0.23

Retrying OS detection (try #2) against 192.168.0.23

NSE: Script scanning 192.168.0.23.

Initiating NSE at 18:07

Completed NSE at 18:07, 0.08s elapsed

Nmap scan report for 192.168.0.23

Host is up (0.00092s latency).

Not shown: 994 filtered ports

PORT STATE SERVICE VERSION

20/tcp closed ftp-data

21/tcp closed ftp

22/tcp open ssh OpenSSH 6.2 (protocol 2.0)

ssh-hostkey: 1024 1f:3a:bo:34:d7:48:30:06:be:ff:59:a3:ed:35:e2:e0 (DSA)

2048 31:c4:8a:e7:07:a3:cb:d1:98:34:52:1e:67:a3:02:69 (RSA)

_256 ob:cb:oc:ff:6d:de:f5:ee:92:57:1a:f9:97:23:6b:c9 (ECDSA)

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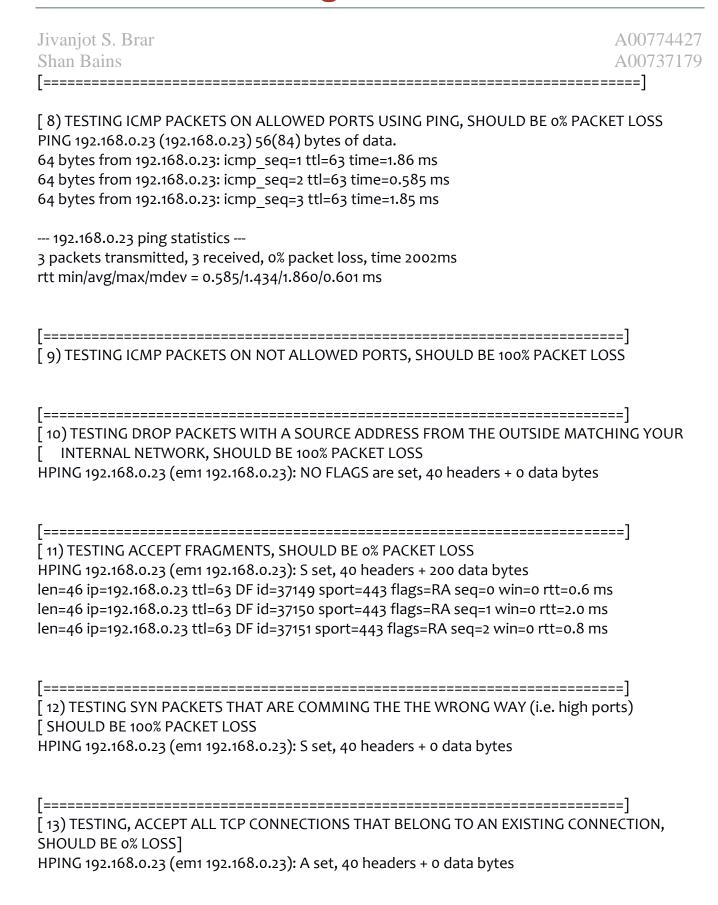
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Shan Bains A00737179 53/tcp closed domain 80/tcp open http Apache httpd 2.4.6 ((Fedora)) http-methods: OPTIONS GET HEAD POST TRACE Potentially risky methods: TRACE See http://nmap.org/nsedoc/scripts/http-methods.html http-title: Test Page for the Apache HTTP Server on Fedora 443/tcp closed https MAC Address: 78:2B:CB:A3:3F:DE (Dell) Aggressive OS guesses: Linux 3.0 - 3.9 (93%), Linux 2.6.22 - 2.6.36 (91%), Linux 2.6.39 (91%), Linux 2.6.32 - 3.6 (90%), Linux 2.6.32 - 3.9 (89%), Crestron XPanel control system (89%), Linux 3.0 (89%), Linux 2.6.18 (89%), Linux 2.6.26 - 2.6.35 (89%), Netgear DG834G WAP or Western Digital WD TV media player (89%) No exact OS matches for host (test conditions non-ideal). Uptime guess: 1.113 days (since Wed Feb 12 15:24:19 2014) Network Distance: 1 hop TCP Sequence Prediction: Difficulty=261 (Good luck!) IP ID Sequence Generation: All zeros **TRACEROUTE** HOP RTT ADDRESS 1 0.92 ms 192.168.0.23 NSE: Script Post-scanning. Initiating NSE at 18:07 Completed NSE at 18:07, 0.00s elapsed Read data files from: /usr/bin/../share/nmap OS and Service detection performed. Please report any incorrect results at http://nmap.org/submit/. Nmap done: 1 IP address (1 host up) scanned in 14.42 seconds Raw packets sent: 2053 (93.736KB) | Rcvd: 33 (2.064KB) [2) TESTING TCP PACKETS ON ALLOWED PORTS 22, SHOULD BE 0% PACKET LOSS HPING 192.168.0.23 (em1 192.168.0.23): S set, 40 headers + 0 data bytes

len=46 ip=192.168.0.23 ttl=63 DF id=0 sport=22 flags=SA seq=0 win=29200 rtt=1.9 ms len=46 ip=192.168.0.23 ttl=63 DF id=0 sport=22 flags=SA seq=1 win=29200 rtt=0.5 ms len=46 ip=192.168.0.23 ttl=63 DF id=0 sport=22 flags=SA seq=2 win=29200 rtt=0.7 ms

Jivanjot S. Brar A00774427 **Shan Bains** A00737179 [3) TESTING TCP PACKETS ON ALLOWED PORTS 80, SHOULD BE 0% PACKET LOSS HPING 192.168.0.23 (em1 192.168.0.23): S set, 40 headers + 0 data bytes len=46 ip=192.168.0.23 ttl=63 DF id=0 sport=80 flags=SA seq=0 win=29200 rtt=0.5 ms len=46 ip=192.168.0.23 ttl=63 DF id=0 sport=80 flags=SA seq=1 win=29200 rtt=0.7 ms len=46 ip=192.168.0.23 ttl=63 DF id=0 sport=80 flags=SA seq=2 win=29200 rtt=0.6 ms [4) TESTING TCP PACKETS ON ALLOWED PORTS 443, SHOULD BE 0% PACKET LOSS HPING 192.168.0.23 (em1 192.168.0.23): S set, 40 headers + 0 data bytes len=46 ip=192.168.0.23 ttl=63 DF id=0 sport=80 flags=SA seq=0 win=29200 rtt=0.7 ms len=46 ip=192.168.0.23 ttl=63 DF id=0 sport=80 flags=SA seq=1 win=29200 rtt=0.6 ms len=46 ip=192.168.0.23 ttl=63 DF id=0 sport=80 flags=SA seq=2 win=29200 rtt=0.8 ms [5) TESTING FOR NOT ALLOWABLE TCP PORTS(eg. port 111), SHOULD BE 100% PACKET LOSS HPING 192.168.0.23 (em1 192.168.0.23): S set, 40 headers + 0 data bytes [6) TESTING UDP PACKETS ON ALLOWED PORTS 53, SHOULD BE 0% PACKET LOSS HPING 192.168.0.23 (em1 192.168.0.23): udp mode set, 28 headers + o data bytes ICMP Port Unreachable from ip=192.168.0.23 get hostname... name=UNKNOWN ICMP Port Unreachable from ip=192.168.0.23 get hostname... name=UNKNOWN ICMP Port Unreachable from ip=192.168.0.23 get hostname... name=UNKNOWN

HPING 192.168.0.23 (em1 192.168.0.23): udp mode set, 28 headers + 0 data bytes



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